

CLAIMS

1. A device for removing a needle cannula from an attachment structure, comprising:

a body defining a passageway allowing passage of a needle cannula therethrough while an attachment structure associated with said cannula is restrained in a first position relative to said body;

first and second engagement members, at least one of said engagement members being movable, in an engagement stroke, to cause engagement between said engagement members of a said needle cannula extending along said passageway, at least one of said engagement members being movable, in an extraction stroke following said engaging stroke, away from said first position while firmly gripping a said needle cannula engaged between said engagement members, said movement during the extraction stroke being such as to maintain a generally constant spacing between said engagement members during said extraction stroke, said generally constant spacing varying in relation to a thickness of the engaged needle cannula, such that engaged needle cannula of different thicknesses may be firmly gripped throughout a said extraction stroke.

2. A device according to claim 1, wherein during said engagement stroke the first engagement member is pivotable about a first pivot axis toward the second engagement member.

3. A device according to claim 2, wherein said pivot axis is mounted for translational movement toward and away from the second engagement member.

4. A device according to claim 2, wherein during said extraction stroke both of said first and second engagement members, and a said needle cannula engaged therebetween, pivot together as a unit about a second pivot axis spaced from said first pivot axis.

5. A device according to claim 4, wherein said first and second engagement members are mounted, respectively, on first and second linkages that are pivotally attached to said body, said first pivot axis being established by a pivotal attachment of said first linkage to said second linkage, said second pivot axis being established by a pivotal attachment of said second linkage to said body.

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6. A device according to claim 5, further comprising an operation handle pivotally mounted relative to said body and being configured to effect pivotal movement of the first linkage, and the first engagement member mounted thereon, in said engagement stroke.

7. A device according to claim 6, wherein said operation handle is engageable with said first linkage in such a manner as to provide an increased extraction force by way of mechanical leverage that increases as the handle is moved through said engagement stroke.

8. A device according to claim 7, wherein said operation handle is engageable with said first linkage in such a manner that said extraction force decreases, and angular displacement of said first linkage increases, with a continued rotation of said operation handle in the extraction stroke.

9. A device according to claim 7, wherein said operation handle is pivotably mounted to said body for pivotal movement into and out of operable engagement with said first linkage.

10. A device according to claim 6, further comprising an elongated hand grip structure attached to said body, said operation handle being pivotable toward said handgrip structure during said engagement stroke and said extraction stroke.

mc 11. A device according to claim 10, wherein said handgrip structure provides, in general alignment with said passage, a cavity for receiving a needle cannula extracted from its attachment structure in a said extraction stroke.

12. A device according to claim 11, wherein said handgrip structure and cavity thereof provide a containment vessel for containing extracted needle cannulas.

13. A device according to claim 5, further comprising a biasing member biasing said second linkage to place the second engagement member mounted thereon in an initial needle cannula engagement position, said biasing member providing a resistive force opposing pivotal movement of said second linkage during said extraction stroke.

14. A device according to claim 5, further comprising a biasing member biasing said first linkage to a rest position spacing the first engagement member away from said second engagement member.

15. A device according to claim 2, wherein during said extraction stroke said first engagement member continues its pivotal movement toward the second engagement member,

and wherein at least one of said engagement members is mounted for translational movement away from the other, said translational movement occurring in relation to said pivotal movement of the first engagement member against a said needle cannula engaged between the first and second engagement members, in such a manner as to maintain said generally constant spacing.

16. A device according to claim 15, wherein said first engagement member is mounted for said translational movement away from said engagement member, in addition to said pivotal movement.

17. A device according to claim 16, further comprising a biasing member for biasing said first engagement member for translation toward said second engagement member, wherein said translational movement away from said second engagement member occurs against a bias of said biasing member.

18. A device according to claim 17, further comprising an adjustment mechanism permitting adjustment of a bias force of said biasing member.

19. A device according to claim 18, wherein said biasing member comprises a compression spring retained within a passage formed in said body, and said adjustment mechanism comprises a stopper threadably received within said passage.

20. A device according to claim 15, wherein said second engagement member is mounted for said translational movement.

21. A device according to claim 15, wherein said second engagement member comprises a backing member along which a needle cannula extending along said passageway is moved as said needle cannula is being gripped and pulled away from said first position by the first engagement member during said extraction stroke.

22. A device according to claim 21, wherein said backing member is configured to slidably engage a needle cannula extending along said passageway, as said needle cannula is being gripped and pulled away from said first position by the first engagement member during said extraction stroke.

23. A device according to claim 21, wherein said backing member is mounted for translational movement toward and away from said first engagement member.

24. A device according to claim 1, wherein said second engagement member is a backing member configured to movably engage a needle cannula extending along said

passageway as said needle cannula is being gripped and pulled away from said opening by the first engagement member during said extraction stroke.

25. A device according to claim 1, said body further defining an opening in general alignment with said passageway, for permitting a said needle cannula to pass therethrough and into said passageway, wherein a body portion adjacent said opening serves to establish said first position at a side of said opening opposite said passageway.

26. A device according to claim 25, further comprising an internally tapered guide structure surrounding said opening, for guiding insertion of a said needle cannula into said opening.

27. A device according to claim 26, said guide structure further comprising an internal shoulder portion for positioning and maintaining in a generally upright position a syringe associated with a needle cannula inserted into said opening.

28. A device according to claim 2, wherein said first engagement member is attached to a lever that is pivotally mounted to said body, wherein an extension of said lever provides a hand graspable operation handle.

29. A device according to claim 28, further comprising an elongated hand grip structure extending from said body, said operation handle being pivotable toward said hand grip structure during said engagement stroke and said gripping stroke.

30. A device according to claim 28, wherein said first engagement member is positioned distally of the second engagement member and comprises a gripping surface facing proximally, toward a distally facing surface of said second engagement member.

31. A device according to claim 1, wherein during said extraction stroke said first engagement member is movable toward the second engagement member and the second engagement member is mounted for movement away from the first engagement member in relation to movement of the first engagement member toward said second engagement member and against a said needle cannula engaged between said first and second engagement members, said movement of the second engagement member being in such a manner as to maintain said generally constant spacing during said extraction stroke.

32. A device according to claim 31, further comprising a biasing member for biasing said second engagement member toward said first engagement member, wherein said movement away from said first engagement member occurs against a bias of said biasing member.

33. A device according to claim 32, further comprising an adjustment mechanism permitting adjustment of a bias force of said biasing member.

34. A device according to claim 33, wherein said biasing member comprises a compression spring retained within a passage in said body, and said adjustment mechanism comprises a stopper threadably received within said passage.

35. A device according to claim 31, wherein said second engagement member is a backing member along which a needle cannula extending along said passageway is, during said extraction stroke, moved as said needle cannula is being gripped and pulled away from said opening by the first engagement member.

36. A device according to claim 35, wherein said backing member is configured to rotatably engage a needle cannula extending along said passageway, as said needle cannula is being gripped and pulled away from said first position by the first engagement member during said extraction stroke.